

III. REMARKS

Reconsideration of the application is requested. Applicants assert that the amendments are made without prejudice and reserve all rights to prosecute any canceled claims, and claims preceding any amendment, and other disclosed (but not presently claimed) embodiments in the application, in future continuation applications, divisional applications, continuation-in-part applications, continuing prosecution applications, requests for continuing examination, re-examination applications and any other application claiming priority from or through the present application.

- **Status of Claims:**

Claims 1, 21 and 46 have been amended, and claims 47 and 48 have been cancelled, without prejudice. Claims 1-46 are ready for examination. Support for the present claims may be found throughout the instant Specification.

Allowable Subject Matter

Claims 10, 17-20, 30, and 37-40 are objected to as they are dependent from a rejected base claim but would be allowable if rewritten in independent form, including all the limitations of the base claim and any intervening claims.

Applicant's Response:

Applicant gratefully acknowledges the Examiner's kind offer to allow the above named claims if rewritten in independent form as stipulated. However, Applicant respectfully submits that in view of the present amendment and the following assertions, the application is deemed in condition for allowance.

Rejections under 35 U.S.C. 103***Examiner's Position:***

The Examiner has again rejected claims 1-9, 11-16, 21-29, 31-36, and 41-46 under 35 USC 103 as obvious over various combinations of references.

Applicant's Response:

Applicant asserts that the rejections under 35 U.S.C. 103 are improper over the cited references taken singly or in combination. Moreover, Applicant submits that the primary reference to Asanuma (US 5,920,819) (hereinafter: "Asanuma '819'") is not even relevant to the claimed invention and therefore cannot be combined with the wide selection of secondary references, neither can its shortcomings be remedied by the secondary prior art.

Applicant asserts that the method relating to the FDMA as alleged by Asanuma '819 is not even remotely suggestive of the instant CDMA type of multiple access scheme. Moreover, the claimed advantageous CDMA system is capable of a multipath signaling by using signals that can be received with different time delays. In contrast, FDMA systems cannot discriminate between the multipath arrivals but have to equalize to mitigate negative effects of multipath signaling.

The Examiner states that the Applicant argues that Asanuma '819 is implemented using an FDMA scheme, and cannot be implemented within a CDMA scheme although this is cited in the prior art of record (Asanuma '819; col. 12 lines 16-19). As an example, the Examiner cites the independent claim of the instant application, where a "***method of operating a CDMA cellular communications system on substantially a same frequency(s) band comprising ...***" it is recited. The Examiner states that the Applicant's primary showing

is that CDMA uses only one carrier frequency. The Examiner further asserts that the claim language, quoted above, does not clearly read that only one frequency band is used and that the Applicants claims therefore teach away from the 37 CFR 1.1.32 affidavit and arguments.

The Applicant respectfully disagrees with the Examiner's interpretation of the quoted phrase, "*substantially a same frequency(s) band.*"

The instant application teaches a cellular system employing code division multiple access (CDMA). CDMA, as described in the instant application, "... is a form of multiplexing and a method of multiple access that divides up a radio channel not by time (as in time division multiple access), nor by frequency (as in frequency-division multiple access), but instead by using different pseudo-random code sequences for each user (<http://wikipedia.org/wiki/cdma>).

In the interest of clarity, code division multiplex (CDM) or code division duplex (CDD) is defined as the combination or multiplexing of isolated communications channels using different code sequences for each channel. Code division multiple access (CDMA) is the employment of CDM to permit the access of multiple separate users to a common communication path. Analogous definitions apply to FDM and FDD with respect to FDMA and TDM and TDD with respect to TDMA.

The phrase, "*substantially a same frequency(s) band*" may be correctly interpreted by first observing that a Code Division Multiple Access (CDMA) system for multiple channel communications, as addressed in the instant application, employs a single "carrier" frequency and utilizes channel unique coding, using a predetermined "codeword," to permit the combination of multiple channels onto a common propagation channel (i.e., free space) for transmission. Upon reception, each of the channels may be independently separated using a copy of the respective channel's "codeword." Note that for CDMA the channel connection is continuous in time and the entire frequency band, available for transmission, is simultaneously utilized.

There are two other techniques for performing combination and separation of channels known as Frequency Division Multiplex (FDM) and Time Division Multiplex (TDM). In its fundamental form, FDM places each of the channels on separate r.f. carriers having unique transmission carrier frequencies. The carriers may thereafter be combined in the common propagation medium (i.e., free space) and transmitted to the receiving site. Each of the channel bearing carriers may be separated, upon reception, by using frequency selective band pass filters, to isolate the desired carrier for demodulation and channel recovery. Note that the created FDM channel connection is continuous in time. In contrast, TDM "chops" each channel into discrete "time blocks." Each channel is allocated a periodic portion of time, or "window", on a single carrier, in the common propagation medium (i.e., free space). Thus the common propagation medium sequentially conveys "time blocks" of all of the channels to the receiver. The receiver is synchronized in time so that it is able to separate the combined channels, based only on their time of arrival. Note that for TDM, all of the frequency band available for transmission is simultaneously utilized.

Thus, in contrast to FDM and TDM, CDMA utilizes the entire spectrum available for transmission on a continuous time basis. The spectrum available for transmission in a communications system is commonly referred to as a "**frequency band**." The spectral width, or "bandwidth" of the frequency band required for a given transmission system is determined by the coded information transmission rate. Greater transmission rates such as those utilized for live video require proportionally greater bandwidths than, for instance, telephony. For a cellular system, which can support a variety of services, such as that described in the instant application, the bandwidth will vary in time, in response to the different services. The term "**substantially**," when used in the phrase "**substantially a same frequency(s) band**," in accordance with common usage in the field, refers to the fact that the bandwidth may vary during operation while keeping the center frequency constant. This is in distinct contrast to multiple center frequencies of the plurality of carriers as is practiced in FDM systems.

Thus the Applicant respectfully asserts that there is no teaching away between the claims of the instant application and the showing of the 37 CFR 1.132 affidavit and

arguments as stated by the Examiner. However, in the interest of expediting this application and improving clarity, the Applicant is amending the phrase appearing in claim 1, “...*substantially a same frequency(s) band...*” to “...*a same frequency band...*”

Claim Rejections – 35 USC § 103

Examiner's Position:

Claims 1-5, 7-8, 21-25, 41-44 and 46 have been rejected under 35 USC §103(a) as being obvious over Asanuma (US 5,920,819) in view of Rappaport (US 5,437,054) and further in view of Wheatley III, et al. (US 6,381,230).

With regard to base claims 1, 21 and 46, the Examiner contends that Asanuma “clearly shows and discloses” an overlay cell mobile communication system performing radio communications, allegedly reading on the claimed operation of CDMA cellular communications system. However, the Examiner admits that Asanuma is silent on selection of carrier frequencies based on power, and alleges that the secondary reference to Rappaport *et al.* remedies this deficiency by disclosing a method for sharing channels in a cellular communication system.

Applicant's Response:

Applicant respectfully disagrees. The cited combination of references neither discloses nor suggests the present invention. On the contrary, it asserted here that as far as CDMA systems is concerned there is no reasonable need or utility for applying the cited reference disclosure of a large number of channels to enhance frequency utilization for FDMA.

Independent Claims 1, 21 and 46

The Examiner described the basis for factual inquires, set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), as being summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or non-obviousness.

The Applicant respectfully asserts that the cited prior art, **Asanuma (U.S. Patent No. 5,920,819)**, taken by itself, as well as in view of **Rappaport et al. (U.S. Patent No. 5,437,054)**, and **Wheatley III, et al. (U.S. Patent No. 6,381,230)** does not, on the basis of steps 1 and 2 of the steps for conducting factual obviousness inquiries cited above, lead to a finding of obviousness.

As directed in step 1, above, the relevant scope and contents of the **Asanuma (#5,920,819)** patent are first examined. A similar examination of the cited **Rappaport (#5,437,054)** and **Wheatley III (#6,381,230)**, patents is next conducted.

Asanuma (#5,920,819) teaches a cellular system comprising a plurality of macro-cells, which include micro-cells within a given macro-cell coverage area. Each cellular user, depending on its location, communicates with either a macro base station or a micro base station. Frequency division multiplex (FDD) is employed, with individual communications channels being time division multiplexed (TDM) on to each of the FDD carriers. A plurality of separate carrier frequencies is allocated for transmission from a given cellular user to its base station and is referred to by **Asanuma (#5,920,819)** as up-carrier frequencies. A corresponding, but different, plurality of separate carrier frequencies is allocated for transmission from the base station to the cellular users and is referred to by **Asanuma (#5,920,819)** as down-carrier frequencies. The macro- and the included micro- base stations share the same pluralities of carrier frequencies on a dynamic basis. Each cellular user/base

station channel connection is assigned to a TDM time slot, on a given up-carrier frequency and a separate TDM time slot on another down-carrier frequency.

At locations within the macro-cell coverage area, where there is also micro-cell coverage, the potential exists for interference between macro-cell and micro-cell coverage. Asanuma (#5,920,819) teaches methods for selecting carrier frequencies, from the common pool, for micro-cell communications so that co-frequency interference to the macro-cell is maintained below an acceptable level. For situations where a corresponding pair of up-carriers and down-carriers cannot be identified, Asanuma (#5,920,819) teaches the time multiplexing (TDM) of the up-channels and down-channels onto a single carrier selected from either of the above mentioned pluralities of carrier frequencies.

It is a fundamental to the disclosure of Asanuma (#5,920,819) that there be a plurality of separate carrier frequencies, from which to select, thereby providing isolation between the various communications channels. The management of interference between the macro-cell and micro-cell systems is accomplished by dynamic assignment of the potentially interfering channels to different carrier frequencies.

Asanuma (#5,920,819) refers to CDMA only twice in the specification.

*"Thus, in comparison with the conventional system in which both of the up carrier frequency and down carrier frequency of one pair of the macro cell system are required to simultaneously satisfy the preset condition, the carrier frequency for assignment can be searched for more easily and in a shorter time. Further, a sufficiently large number of channels for micro cell can be obtained, and as a result, the frequency utilization factor can be further enhanced. This effect is particularly effective in a system utilizing a **code division multiple access (CDMA)** system in which adjacent cells often use the same carrier frequency."* (col 3, lines 26-35)

In this first reference, Asanuma (#5,920,819) is clearly referring to a technique for selecting a useable carrier frequency for establishing communications. Even in that context,

Asanuma (#5,920,819) only identifies the techniques applicability to the situation where adjacent cells, rather than overlapping coverage cells, are the potential interference source(s).

"In the above embodiment, a case wherein the FDMA scheme is used as the radio access scheme of the macro cell system is explained, but this invention can also be applied to a system using the TDMA scheme or CDMA scheme."(col 12, lines 16-19)

In this second reference, Asanuma (#5,920,819) states that the teachings may be applied to a system employing TDMA or CDMA. As described supra, Asanuma (#5,920,819) fundamentally teaches, and claims, a system that manages the coexistence of a macro-cell and micro-cell system exclusively using FDM carrier selection techniques. These techniques are not available to pure TDMA or CDMA systems and the teachings of Asanuma (#5,920,819) are irrelevant.

Thus the two Asanuma (#5,920,819) references cited by the examiner do not teach the use of the disclosed technology for CDMA systems.

The second Examiner cited prior art, Rappaport (#5,437,054), teaches a method and apparatus for managing the assignment and sharing of channels in a cellular system. The described system does not address the use of micro-cells within the coverage region of a given macro-cell nor does the teaching address a particular multiplexing or multiple access technique such as TDM, FDM or CDM.

Fundamentally, Rappaport (#5,437,054) teaches a scheme for borrowing channels from an adjacent macro-cell, on an as-needed basis, to supplement the normal channel capacity of a given macro-cell base station, without the use of channel locking. Channel locking is a coordination technique, based on the cellular system's physical geometry, to prevent the reuse of the given channel within the "minimum separation distance" to a potentially interfering base station. "Minimum separation distance" is a frequency coordination concept which is used to specify the minimum physical separation distance between two potentially interfering stations. The Rappaport (#5,437,054) teachings include

techniques for insuring that the interference level is maintained at an acceptable level through the use of power control.

It is observed that the Rappaport (#5,437,054) teachings are limited to system configurations in which each of the base stations, assigned to adjacent macro-cells, can provide shared communications resources which are orthogonal or isolated. Although not taught by Rappaport (#5,437,054), it is conventional practice to operate adjacent cells on different carrier frequencies. Thus the shared communications resource donated by an adjacent cell base station will not interfere with the cell's primary base station. This teaching is therefore not relevant for the micro-cell within a macro-cell architecture where the micro- and macro- cell base stations share frequency, time and code domains and have the potential for mutual interference.

The third Examiner cited prior art, Wheatley III (#6,381,230), teaches, in part, methods for avoiding unacceptable interference from a subscriber station, which is communicating with a micro-cell base station. The methods taught include terminating communication with the subscriber base station or executing a handoff of the subscriber station to the macro-cell base station when the transmit power of the subscriber station exceeds a predetermined threshold. Additionally, the cited prior art teaches variable power control of the subscriber station as a means of interference control. It should be noted that the teachings exclusively deal with interference originating from the subscriber or user station and not with interference originating at the micro-cell base station.

The second step of the *Graham v. John Deere* inquiry is ascertaining the differences between the prior art and the claims at issue. Claim 1, the first independent claim of the instant application specifies a method for operating a CDMA cellular system with a micro-cell within macro-cell architecture. Claim 21 is an independent claim for a computer operable controller which is operatively configured to carry out the teachings of claim 1. Claim 46 claims a cellular system that provides, in accordance with the teachings of claim 1,

corresponding micro-cell within macro-cell operation. Independent claims 1, 21 and 46 are initially addressed.

As discussed supra, each participant in a CDMA communications system utilizes the same “carrier” frequency on a continuous time basis. Thus there are no separate carrier frequencies or separate time slots available to isolate interfering channels in a CDMA system. The Applicant thus respectfully asserts that the teachings of Asanuma (#5,920,819) cannot be practiced by the CDMA system specified in the instant application.

The first limitation of claim 1 teaches:

*“(1) providing at said micro cell base station **non-real time data services** when permitted by a dynamic interference level from the perspective of said micro-cell, which dynamic interference is caused by said macro cell base station.”*

The second limitation of claim 21 correspondingly teaches:

*“the computer operable controller comprising: a memory storing an algorithm providing a said micro cell base station **non-real time data services** when permitted by a dynamic interference level from said micro cell, which dynamic interference level is caused by said macro cell base station;”*

The first limitation of claim 46 correspondingly teaches:

*“(1) to provide at said micro cell base station **non-real time data services** when permitted by a dynamic interference level from the perspective of said micro cell, which dynamic interference is caused by said macro cell base station;”*

The teaching of delaying transmission of non-real time data, by the micro-cell base station, until interference limitation requirements are satisfied, is, in part, a differentiation over the cited prior-art. The provision of non-real time data transmission is supported by multiple paragraphs in the specification. In [0006] of U.S. Patent Application Publication No.

20060019665 it is stated that, "By utilizing the ability to delay packet switched data for the users in the micro cell, the service of circuit switched users in the macro cell can be prioritized whilst serving all users in the same frequency band(s)." While [0051] describes the conditions for handover to a micro-cell base station where it is stated that, " This threshold depends on the type of non-real time service, and micro and macro cell load and interference level." Other sections of paragraphs [0053] and [0074] describe the queuing of non-real time data.

Therefore, the Applicant further respectfully asserts that neither Asanuma (#5,920,819) nor Rappaport (#5,437,054) nor Wheatley III (#6,381,230), nor any combination, teaches the content of instant independent claims 1, 21 and 46, with respect to the employment of non-real time data transmission techniques as a method of interference management.

The fourth limitation of claim 1 teaches:

"(4) maintaining said quality of service above said predetermined threshold for any cellular communications device(s) served by the at least one macro cell base station that is within a predetermined range of the micro cell base station by limiting the power of signals transmitted in step (1) from the at least one micro cell base station. "

The fifth limitation of claim 21 correspondingly teaches:

"whereby said computer is programmed to maintain said quality of service above said predetermined threshold for any cellular communication device(s) served by the macro cell base station that is within a predetermined range of the micro cell base station by limiting the power of signals comprising said non-real time data services transmitted from the micro cell base station. "

The fourth limitation of claim 46 correspondingly teaches:

“(4) to maintain said quality of service above predetermined threshold for any cellular communication device(s) served by the at least one macro cell base station that is within a predetermined range of the micro cell base station by limiting the power of signals transmitted in step (1) from the at least one micro cell base station.”

The instant claims, therefore, teach the use of limiting or reducing the power level of the micro-cell base station as a means of maintaining the quality of service for any user of the co-coverage macro-cell base station.

The Applicant therefore respectfully asserts that Asanuma (#5,920,819) does not teach the content of instant independent claims 1, 21 and 46, with respect to power control for interference management. In addition, with respect to this same limitation, the Examiner has cited Rappaport (#5,437,054) as teaching that,

“... a channel can be borrowed at limited transmitted power. In order to avoid possible increases in co-channel interference caused by channel borrowing, the borrowed channels are utilized with reduced or limited transmitted power.”

One of ordinary skill would understand, after studying Rappaport (#5,437,054), that the co-channel interference referred to in Rappaport ('054) is the interference between regular macro-cell base stations having separated geographical coverage areas or cells, where the described channel borrowing would violate the normal “minimum separation distance” requirements employed for frequency coordination. The system context of Rappaport ('054) stands in contrast to the instant application where the interfering base stations share a common coverage area. The Applicant respectfully asserts, that, based on these facts, the Rappaport ('054) disclosure is irrelevant with respect to a Graham obviousness inquiry.

The Applicant also respectfully asserts, that with respect to the fourth limitation of claims 1 and 46 and the fifth limitation of claim 21, the limiting the power of signals clearly refers to signals being transmitted from the micro-cell base station, not those emitting from

the subscriber or user station. As previously stated, the disclosure of Wheatley, III, et al. are limited to emissions of the subscriber or user station. The Wheatley, III, disclosure does not therefore encompass the fourth limitation of instant claims 1 and 46 and the fifth limitation of claim 21.

On the basis of the above comparisons of the instant independent claims 1, 21 and 46 to the Examiner cited prior art Asanuma ('819), Rappaport ('054) and Wheatley III ('230) references, the Applicant respectfully asserts that a finding of **obviousness cannot be concluded** in accordance with steps 1 and 2 of the Graham v. John Deere guidelines, or in view of MPEP 2143.03 where it is stated that in order to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.

With respect to claim 3 (Office Action 01/26/2007; page 8), the Examiner states, "... that since the micro-cell is smaller and transmits less power than the macro cell, its interference will inherently be less than that of the macro cell." The Applicant disagrees with this statement. The received level of interference is also dependent on the relative location of the user terminal with respect to the two base stations and antenna directivity properties of the base stations and the user terminal. Further, while it is true that the micro-cell transmits less power in most systems, certain system configurations may dictate higher micro-cell base station power. On example of such a configuration, is in applications where the immediate vicinity of the micro-cell suffers from poor radio propagation due to building structure shielding effects.

Dependent Claims 2, 3, 4, 5, 7, 8, 42, 43, and 44

Claims 2, 3, 4, 5, 7, 8, 42, 43, and 44 depend either directly or indirectly from independent claim 1. The Applicant respectfully asserts that claim 1 is nonobvious as explained supra. In accordance with MPEP para. 2143.03, if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. Therefore, it is respectfully submitted that dependent claims 2, 3, 4, 5, 7, 8, 42, 43 and 44 are nonobvious over the cited art and should also be allowed.

Dependent Claims 22, 23, 24, 25, 27, 28, and 41

Claims 22, 23, 24, 25, 27, 28, and 41 depend either directly or in directly on independent claim 21. The Applicant respectfully asserts that claim 1 is nonobvious as explained supra. In accordance with MPEP para. 2143.03, if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. Therefore, it is respectfully submitted that dependent claims 22, 23, 24, 25, 27, 28, and 41 are nonobvious and should be allowed.

Dependent Claims 6 and 26

Claim 6 depends indirectly on independent claim 1. Claim 26 depends indirectly on independent claim 21. The Applicant respectfully asserts that claims 1 and 21 are nonobvious as explained supra. In accordance with MPEP para. 2143.03, if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. Therefore, it should be concluded that dependent claims 6 and 26 are nonobvious and should be allowed.

Dependent Claims 9 and 29

Claim 9 depends indirectly on independent claim 1. Claim 29 depends indirectly on independent claim 21. The Applicant respectfully asserts that claims 1 and 21 are nonobvious as explained supra. In accordance with MPEP para. 2143.03, if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. Therefore, it should be concluded that dependent claims 9 and 29 are nonobvious and should be allowed.

Additionally, the Examiner has cited Bloch (U.S. Patent No. 6,765,898), on Page 25, Item 7 of the Office Action dated January 26, 2007. The cited Bloch (#6,765,898) patent teaches the use of antenna null steering to reduce interference received by the micro-cell base station. The Applicant respectfully asserts that the teachings of the Bloch patent (#6,765,898)

are not relevant, in that the instant application only addresses interference transmitted by the micro-cell base station.

Dependent Claims 11, 31, and 45

Claim 11 depends directly on independent claim 1. Claim 45 depends indirectly on independent claim 1. Claim 31 depends directly on independent claim 21. The Applicant respectfully asserts that claims 1 and 21 are nonobvious as explained supra. In accordance with MPEP para. 2143.03, if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. Therefore, it should be concluded that dependent claims 11, 31, and 45 are nonobvious and should be allowed.

Dependent Claims 12, 13, 32, and 33

Claims 12 and 13 depend directly on independent claim 1. Claim 32 depends directly on independent claim 21. Claim 33 depends indirectly on independent claim 21. The Applicant respectfully asserts that claims 1 and 21 are nonobvious as explained supra. In accordance with MPEP para. 2143.03, if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. Therefore, it should be concluded that dependent claims 12, 13, 32, and 33 are nonobvious and should be allowed.

Dependent Claims 14 and 34

Claim 14 depends directly on independent claim 1. Claim 34 depends directly on independent claim 21. The Applicant respectfully asserts that claims 1 and 21 are nonobvious as explained supra. In accordance with MPEP para. 2143.03, if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. Therefore, it should be concluded that dependent claims 14 and 34 are nonobvious and should be allowed.

Dependent Claim 15

Claim 15 depends directly on independent claim 1. The Applicant respectfully asserts that claim 1 is nonobvious as explained supra. In accordance with MPEP para. 2143.03, if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. Therefore, it should be concluded that dependent claim 15 is nonobvious and should be allowed.

Dependent Claims 16 and 36

Claim 16 depends directly on independent claim 1. Claim 36 depends directly on independent claim 21. The Applicant respectfully asserts that claims 1 and 21 are nonobvious as explained supra. In accordance with MPEP para. 2143.03, if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. Therefore, it should be concluded that dependent claims 16 and 36 are nonobvious and should be allowed.

Dependent Claim 35

Claim 35 depends indirectly on independent claim 21. The Applicant respectfully asserts that claim 21 is nonobvious as explained supra. In accordance with MPEP para. 2143.03, if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. Therefore, it should be concluded that dependent claim 35 is nonobvious and should be allowed.

In view of the amendment and remarks set forth above, Applicant respectfully asserts that the rejection of the pending claims as amended under 35 USC 103 is improper. Applicant has made a good faith effort to place this application in condition for allowance, which favorable action is herewith solicited.

CONCLUSION

The Examiner is herewith invited to contact the undersigning agent for Applicant by telephone if the corrective action needs further amendment.

Respectfully submitted,

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